

Preventing Groundwater Contamination



Fact Sheet

WHY BE CONCERNED?

Good quality groundwater is one of Michigan's great natural resources. Groundwater provides drinking water for about 44 percent of the state's population. Unfortunately it might become contaminated when even seemingly harmless materials and wastes are improperly handled. Contamination may involve different chemicals, excess amounts of nitrogen and phosphorus, and pathogens like bacteria and viruses. Once groundwater is contaminated, it may be difficult and expensive to clean up. Sometimes it is impossible to clean it up to drinking water standards. This contamination not only threatens public health and the environment, it can also cost businesses and the public large amounts of money in fines, lawsuits, and cleanup costs. Due to the high costs of contamination, banks and lending institutions often require environmental audits of properties before making loans to businesses.

Future groundwater contamination can be avoided. The following will help you identify types of materials that you might have and how these materials might get into the groundwater. In addition, it presents several waste reduction tips which are designed to help small businesses.

MATERIALS OF SPECIAL CONCERN

Materials that contaminate groundwater are usually liquids or water soluble solids. Contamination caused by gases is possible, but rare.

Of particular concern for groundwater protection are materials such as:

- *Acids*
- *Antifreeze*
- *Bases (caustics)*
- *Cleaning fluids & detergents*
- *Cooling water*
- *Degreasers*
- *Dust or emission collector water*
- *Fertilizers*
- *Fuels*
- *Fungicides*
- *Herbicides*
- *Inks*
- *Liquids containing heavy metals*
- *Medicines*
- *Oils and greases*
- *Paints*
- *Pesticides*
- *Rinse water*
- *Salts*
- *Sanitary sewage*
- *Sewage sludge*
- *Solvents*
- *Wash water*
- *Waste process sludges*
- *Waste process solutions*

MICHIGAN DEPARTMENT OF
ENVIRONMENTAL QUALITY
ENVIRONMENTAL SCIENCE AND SERVICES DIVISION
PO BOX 30457
LANSING MI 48909-7957



www.michigan.gov/deq
Environmental Assistance Center
1-800-662-9278

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Of course, there are any number of materials that can contaminate groundwater. The above substances are spotlighted because they are commonly used or produced by businesses. Table 1 shows examples of wastes commonly generated by specific businesses that may contaminate groundwater.

Table 1 WASTES GENERATED BY SMALL BUSINESSES THAT MAY CONTAMINATE GROUNDWATER	
BUSINESS	PROBLEM WASTE GENERATED
All Businesses	Sanitary sewage
Vehicle Service and Body Repair	Oil, antifreeze, solvents, fuels, paints, metal residues
Car/Truck Wash	Road salt, gasoline, antifreeze, oil-laden wash and rinse waters, cleaners
Metal Parts Cleaning	Alkaline solutions, solvents, phosphate solutions, metal residues, rinse waters, oil and greases
Laundromat	Dirty washwater, detergents, laundry pre-wash solvents
Dry Cleaning	Solvents, filters
Furniture Repair and Refinishing	Solvents, paints, varnishes, shellac
Photo Finishing/Silk Screening/Printing	Process chemicals, inks
Paint Mixing	Paints, solvents, pigments
Food Processors	Food scraps and juices, washwater, cooling water, salt

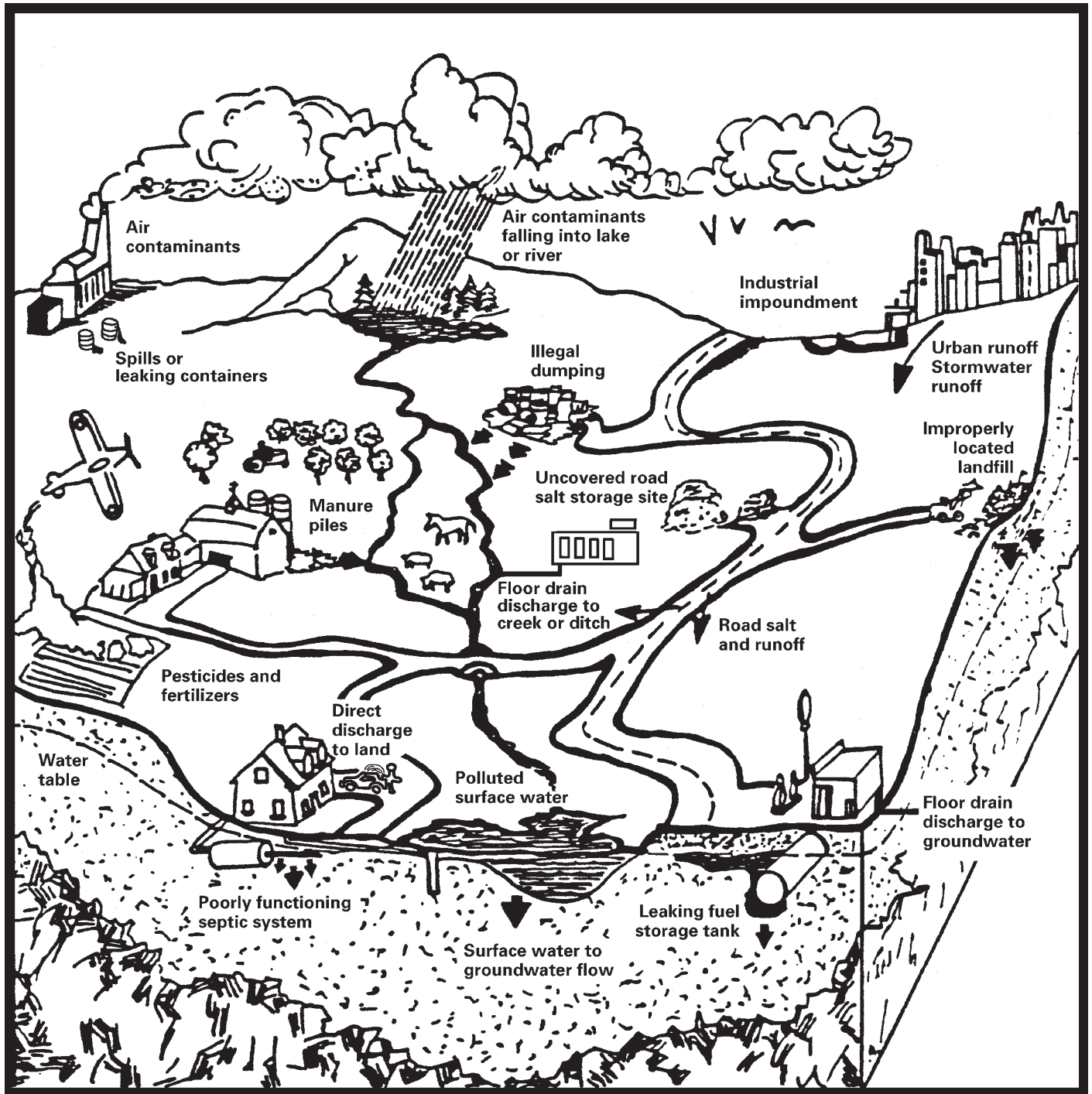
GROUNDWATER CONTAMINATION ROUTES

Business owners, municipalities, and the public should understand that contamination can enter the groundwater by many routes. Figure 1 shows common ways that might lead to groundwater contamination.

Anyone improperly using any of the following waste disposal options may be contributing to groundwater contamination.

Figure 1

GROUNDWATER CONTAMINATION ROUTES



Floor Drains

Businesses may use floor drains to dispose of liquid wastes only if the drains:

- (1) *discharge to a municipal sewer system and the discharge has been approved by the local sewer authorities;*
- (2) *discharge to a holding tank from which the waste is subsequently pumped and hauled by a licensed hauler for appropriate disposal at an approved facility; or*
- (3) *discharge to ground or surface waters if the business has a permit or an exemption to discharge that waste from the Michigan Department of Environmental Quality under Part 31 of 1994 P.A. 451, as amended.*

Businesses and municipalities with floor drains in their facilities that do not comply with one of the three permissible options are urged to fill and cap them with concrete. This will prevent accidental discharges, particularly by employees that may not follow established procedures. It may be necessary to install secondary containment to capture liquids that formerly went down the drain.

Similarly, any unused pipe or conduit that exits from a business facility should be permanently blocked or removed to prevent improper discharges.

Septic Systems

Industrial chemicals and wastewater should not be discharged to septic systems that are designed for sanitary wastes. Not only is this practice a regulatory violation, but it will usually destroy the bacteria that are needed for the system to function properly.

Chemicals and Wastes Contaminate the Groundwater Through These Common Systems

- Floor drains connected to a storm sewer, ditch, or stream;
- Floor drains connected to tile fields or dry wells;
- Septic tanks and dry wells;
- Septic tanks and tile fields;
- Unlined ponds or lagoons;
- Pouring or spraying directly onto the ground.

Storage Tanks

There are different federal and state regulatory requirements for above ground and underground storage tanks and for tanks holding hazardous and petroleum products and hazardous waste. Businesses must have measures to protect the tanks from corrosion and insure that no leaks, spills, or overfilling take place. Annual tank registration is required for some tanks holding products.

A current trend in industrial design is to use above ground tanks and piping rather than underground tanks and piping systems. This provides easier monitoring and maintenance and quicker detection of leaks.

REGULATORY HELP

Table 2 on page 4 lists state and local agencies that have groundwater protection regulations and may provide guidance to your business on storage and disposal of products and wastes. These agencies can provide explanations of federal and state laws and offer technical advice on how to prevent contamination.

PREVENTION OF GROUNDWATER CONTAMINATION

Businesses are wise to design their facility, production processes, and operating procedures with prevention of discharges to the environment in mind. Often, advanced planning will avoid the need to obtain

Table 2
STATE AND LOCAL REGULATORY AGENCIES

GROUNDWATER DISCHARGE	Water Division Michigan Department of Environmental Quality 517/373-8148 or District Office
SURFACE WATER DISCHARGE & STORMWATER RUNOFF	Water Division Michigan Department of Environmental Quality 517/241-1346 or District Office
WASTE DISPOSAL	Waste and Hazardous Materials Division Michigan Department of Environmental Quality 517/373-2690 or District Office
ABOVEGROUND STORAGE TANKS —with contents having a flashpoint below 200°F UNDERGROUND STORAGE TANKS	Waste and Hazardous Materials Division Michigan Department of Environmental Quality 517/335-7211 Local Fire Marshal
GROUNDWATER TESTING	County Health Department
SEPTIC SYSTEM INSTALLATION	County Health Department or Water Division Michigan Department of Environmental Quality 517/373-8148
BUILDING AND OUTDOOR PRODUCT STORAGE (SECONDARY CONTAINMENT)	Water Division - District Office Environmental Science and Services Division Michigan Department of Environmental Quality (for secondary containment and pollution incident prevention plan publications) 800/662-9278 Consultation, Education & Training Division Michigan Department of Labor and Economic Growth (for flammable & combustible liquids storage) 517/322-1809 Local Government Building, Zoning Office, or Fire Marshal
AGRICULTURAL GROUNDWATER ISSUES	Environmental Stewardship Division Michigan Department of Agriculture 517/241-0236
PUBLIC DRINKING WATER	Water Division Michigan Department of Environmental Quality 517/241-1355 U.S. Environmental Protection Agency Drinking Water Hotline 800/426-4791
REPORTING SPILLS	Reporting requirements depend on which regulations a facility is subject to. Go to www.michigan.gov/deq and search on "Spill /Release Reporting"

If you are unsure who to contact, call the Environmental Assistance Center at 800/662-9278 or search these Internet sites for more information:

www.michigan.gov/deq
www.michigan.gov/mda
www.michigan.gov/cis
www.epa.gov/region5

groundwater discharge permits; help assure compliance with local, state, and federal regulations; reduce the possibility of potential liability and clean-up costs; and may result in lower operating costs.

Here are some ways businesses can prevent groundwater contamination:

- Practice **waste reduction**. Make a list of current waste generated and ask, for each item, "Is there a way I can avoid producing this waste?" Try to reduce the toxicity and amount of waste generated. Remember that unused raw materials, inefficient production processes, and poor maintenance practices cost extra money as well as increase the amount of waste requiring disposing. In addition to considering the following suggestions, Michigan's small businesses may want to request a nonregulatory pollution prevention assessment through the Retired Engineer Technical Assistance Program (RETAP). Call 800/662-9278 for more information.

-Replace toxic raw materials with non-toxic or less toxic raw materials wherever possible.

-Replace toxic operational supplies, such as cleaners and solvents, with non-toxic or less toxic materials wherever possible.

-Improve production process efficiency so that less raw material ends up as waste that must be disposed. Reuse samples in production.

-Encourage employees to think "waste reduction." Better yet, include them in the planning process – they have good ideas. Give them an economic incentive to reduce waste.

-Reuse and recycle process by-products as raw materials, either on-site or in another company's process. Examples include process and cleaning solutions, wash water, rinse water, and cooling water.

-Implement a computerized inventory control system that will ensure that chemicals are purchased only in required amounts and provides an alert to possible spoilage or obsolescence.

Also, make sure that raw material containers are fully emptied or, if partially filled, properly labeled and re-entered in the inventory.

-Implement a computerized waste control system. Make sure that wastes are properly labeled so there is no need for future testing and analysis. Also, make sure that wastes are mixed only when there is no potential for reuse or recycling and when mixing is not prohibited by regulations.

-Design process equipment to minimize waste. Use a centrifuge rather than a filter, for example, to avoid filter cartridge disposal.

-Implement an aggressive equipment maintenance program to prevent leaks. Periodically check tanks, seals, pipe joints and other equipment for needed repairs.

- Contain and immediately clean up any spills, leaks, and drips that do occur. Build or purchase secondary containment structures. Use drip pans under spigots or other areas where there is likely to be seepage. Review the DEQ publication, "Guide to Understanding Secondary Containment Requirements in Michigan," for more information.
- Use absorbents for spills when necessary, but do not rely upon them as the first line of defense. Used absorbents must be disposed with the same degree of care as the materials that are being absorbed. It is more desirable to recapture the material in a form that allows reuse or recycling.

- Install a catch basin in loading and unloading areas. Nearly one-third of all accidental spills occur at loading docks. Keep rainwater and dirt out of the catch basin.
- Hook up to a municipal sewer system if possible. Pretreat process wastes to comply with local ordinances or applicable federal categorical pretreatment standards.
- If hook up to a municipal sewer system is not possible, route wastewaters (such as contaminated washwater) to holding tanks, which can be periodically pumped out. Hire a licensed liquid industrial waste hauler to pick up the wastewater for proper disposal.
- If you are hooked up to your own treatment and disposal system, make sure it is permitted by either the local health department or the Michigan Department of Environmental Quality, it is upgraded to the current treatment standards, and it is operated and maintained by properly trained employees.
- Perform all outside work on a sealed concrete or asphalt paved surface surrounded by a berm or dike.
- Store raw materials and wastes under a roof or other protective cover and on a sealed concrete or asphalt paved surface. Provide additional secondary containment when necessary.
- Make sure the manufacturer's directions are being followed when mixing materials to avoid using more than needed and making materials more hazardous than necessary. For large volumes and routine mixing, it is better to install an automated mixing system.
- Do not dispose of items that contain hazardous materials, such as PCB, mercury and lead, in trash that will be buried in a sanitary landfill or that will be incinerated. Recycle used fluorescent and high intensity lamps, small batteries, capacitors containing PCB, mercury thermometers, and other lab instruments or handle them as hazardous waste.
- Develop emergency response plans that identify potential problem areas and address what actions are needed to reduce environmental and health risk. Under some circumstances, you may be legally required to have these plans.
- Learn more about groundwater and the impact you have on it. Numerous resources are available through your library, by contacting the environmental agencies, or searching the Internet. For example, go to www.deq.state.mi.us or www.epa.gov/seahome/gwprimer.html.

Experience has proven that waste reduction and conscientious material management usually pay for themselves within a short time. Proper material management may prevent future liability concerns. It pays to handle material wisely – both short term *and* long term.

BUSINESS-SPECIFIC WASTE REDUCTION TIPS

AGRICULTURE/LAWN CARE/ GROUNDSKEEPING

- Follow the manufacturer's directions exactly to mix and apply insecticides, fungicides, rodenticides, fertilizers, and other agricultural and floral products.
- Measure materials when mixing so that only the amount needed is mixed and the concentrations of the active ingredients are within recommended limits.
- Apply materials only as directed; do not spray on windy or rainy days, except when wet application is instructed.
- Do not spray materials near open water. Many agricultural products are toxic to aquatic life.
- Rinse containers prior to disposal. Use the rinse water in mixing new chemical batches.
- Ask the retailer of the product to take rinsed plastic containers back and return them to the manufacturer for recycling. Plastic insecticide and other containers are being recycled in many areas.

BLENDING/MIXING PAINTS & CHEMICALS

- Mix similar batches in succession to avoid stringent cleaning of mixing equipment between batches.
- When volume requirements permit, dedicate mixing equipment to specific substances or colors.
- Use water-based paints and cleaners in preference to solvent-based materials.
- Collect and reuse spent cleaning solvents as thinners for new batches of the same composition. For example, spent cleaning solvents can be used in paints.
- Reclaim used cleaning solvents that cannot be used in new product through on-site distillation or off-site solvent reclamation.



AUTO BODY SHOPS

- Use water-based paints and cleaners whenever possible.
- Use high-solids, solvent-based paints with low volatile organic compounds (VOC) when suitable water-based paints are not available.
- Use low-pressure, high-volume paint applicators to minimize paint overspray.
- Paint in batches of similar colors.
- Use paint gun washers to clean spray guns; this equipment is much more efficient and uses less solvent than manual gun cleaning.
- Collect waste paints, oils, and chlorinated solvents separately for recycling.
- Fully discharge all pressurized spray paint cans and recycle the empty containers as scrap metal.

CAR/TRUCK WASHES

- Place washing pads on a slope so wash waters can easily be collected.
- Recycle and reuse all runoff from washing pads. For large operations, the use of reverse osmosis or ultrafiltration systems may be justified to remove contaminants and provide "clean" washing fluid.
- Replace cleaning products containing highly toxic or harsh materials with safer, biodegradable products.
- Use high pressure, low-flow washing nozzles and regulate water flow to reduce runoff volume.
- Use hot water since it is a "better solvent" than cold water.



BUSINESS-SPECIFIC WASTE REDUCTION TIPS

METAL PARTS AND EQUIPMENT CLEANING

- Switch from petroleum or chlorinated solvent-based cleaners to water-based cleaners. Strive to eliminate all usage of chlorinated solvents.
- Perform all cleaning at cleaning stations that are designed to capture and reuse the cleaning fluid. Keep covers on the cleaning stations closed, except while the station is being used.
- Use immersion cleaning for easily removed contaminants.
- Use high-pressure, low-volume spray nozzles to remove difficult contaminants. Use ultrasound devices in the cleaning tank to improve cleaning efficiency.
- Maintain cleaning baths at the manufacturer's recommended concentration and temperature.
- Allow cleaned parts and assemblies to drain or dry over the cleaning station long enough so that there is no dripping onto the floor.
- Reclaim dirty water-based cleaners through ultrafiltration and dirty solvents through distillation. Reclamation of water-based cleaning solutions is usually done on-site. However, businesses may reclaim solvents on-site with in-house stills or rely on off-site distillation services.
- Use less solvent by using a spray bottle to moisten the rags instead of soaking the rags in solvent or by spraying the solvent directly on the part and then wiping it off.

FURNITURE REPAIR AND REFINISHING

- Use water-based paints and cleaners in preference to solvent-based materials.
- Reuse solvents used to rinse paint guns and piping for thinning paints of the same color.
- Reclaim dirty water-based cleaners through ultrafiltration, and dirty solvents through distillation. Reclamation of water-based cleaning solutions is usually done on-site. However, businesses may reclaim solvents on-site with in-house stills or rely on off-site distillation services.
- Stain or paint parts with the same color at the same time, and schedule batch painting of lighter shades of paint prior to darker shades so it is not necessary to clean the equipment between jobs.
- Flush equipment first with dirty solvent before final cleaning with virgin solvent.
- Train spray gun operators in proper spray techniques to minimize coating waste generation.
- Replace water-based paint booth filters with dry filters.

LAUNDROMATS/DRY CLEANERS

- Where possible, place washing machines on a slightly slanted floor so that accidental leaks will run to a collection area where workers can easily gather the waste materials for reclamation or proper disposal.
- Install and use a recirculating or closed loop system to collect and reclaim laundry wastewaters and dry cleaning solvents. Use ultrafiltration or reverse osmosis to reclaim laundry wastewaters. Use distillation units to reclaim dry cleaning solvents.
- Use condensate water containing perc as part of the prespotting solution.
- Put up signs in laundromats asking customers to limit the use of bleaches, home degreasers, and other harsh chemicals. Explain that the reason for the request is to protect our groundwater from contamination.
- Clean filters, lint screens, drying sensors, and cooling condenser coils regularly.
- Replace seals and gaskets on doors and button traps as needed.
- Replace transfer machines with dry-to-dry machines.

PHOTOFINISHING



- Use counter-current rinsing in photo developing to minimize the disposal of contaminated water.
- Use squeegees to remove excess liquid during the development of photographic film to minimize carry-over of chemicals from one bath to the next.
- Monitor and maintain the concentrations of bleach fixer to prolong the life of the fluid.
- Use floating lids on bleach and other fixer solutions to minimize oxidation and extend fluid life.
- Keep unused solutions in closed containers to prevent oxidation. Add glass marbles to the containers as fluids are used, to minimize the amount of air in the closed containers.
- Use ion exchange to regenerate color developer.
- Collect spent photographic fixer solutions (as well as photographic paper and film) for silver recovery. The silver recovery may be done in-house or by a silver reclaimer.
- Recycle cartridges, cassettes, and photographic paper spools.

BUSINESS-SPECIFIC WASTE REDUCTION TIPS

PRINTING/SILK SCREENING

- Use non-toxic inks, free of heavy metal pigments.
- Use water-based inks, ultraviolet inks or electron beam drying (EB) inks in preference to solvent-based inks.
- Batch similar printing orders (i. e., same ink) to minimize cleanup between ink changes.
- Fill ink fountains only for a run or shift. Return unused, non-emulsified ink to a closed storage container. Install automatic ink levelers to keep ink fountains at their optimal levels for good print quality.
- Clean ink fountains only when changing color or to prevent drying out. Use a non-drying spray aerosol to prevent ink dry-out when possible.
- When possible, dedicate presses to a specific ink type and color.
- Mix ink cleaning solutions and ink residues with new ink to the maximum extent possible. Generally, these materials can be used in black inks.
- Collect and reclaim spent cleaning solvents that cannot be reused in new ink.
- Use on-site distillation or an off-site solvent reclaimer. Spent solvents must be handled as hazardous waste.
- Collect used cleaning rags and absorbent pads and have them cleaned by a commercial laundry service.

VEHICLE MAINTENANCE AND REPAIR SHOPS



- Collect used motor oil, transmission fluid, brake fluid, grease, and oil filters for recycling.
- Used oil filters should be turned upside down so that as much oil as possible is drained into the waste oil container. The waste lubricants and drained filters should be marketed to a used oil recycler.
- Collect used antifreeze. Most service stations will want to market the material to an antifreeze recycler. However, large fleet maintenance operations may wish to consider installing a distillation unit for in-house recycling of the material. A relatively low-cost unit will quickly pay for itself in reduced disposal costs, plus the value of the reclaimed antifreeze.
- Collect waste gasoline and diesel fuel. Do not use for cleaning. Instead, market to a licensed fuel reclaimer.
- Use water-based cleaners in preference to chlorinated or petroleum solvents to the extent possible.
- Strive to eliminate use of solvent-based cleaners.
- Require maintenance personnel to wash parts at cleaning stations that are designed to capture and reuse the cleaning material. This is especially important when petroleum solvents or chlorinated solvents are used. Keep covers closed on the cleaning stations when not in use.
- Collect dirty petroleum solvents and chlorinated solvents for recycling.
- Reuse automotive parts when possible or recycle as scrap metal.
- Prevent leaks and spills as much as possible by using drip pans under vehicles. Use absorbent pads and pigs, rather than granular absorbents, to soak up oily spills. The cloth-covered materials can be reused after squeezing and/or laundering.
- Have a commercial service launder wiping rags rather than discarding them with the general trash.
- Send batteries to a reclamation facility or back to the distributor.
- Have scrap tires picked up by a registered hauler and taken for recycling.
- Buy motor oil in bulk to reduce packaging waste.
- Use less solvent by using a spray bottle to moisten the rags instead of soaking the rags in solvent or by spraying the solvent directly on the part and then wiping it off.

By following these suggestions, businesses and municipalities in Michigan can save money and help protect groundwater quality. Liability is also reduced when materials are properly managed. Preventing hazardous materials from entering the groundwater benefits everyone.

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